

Solar flares and related coronal magnetic field structures

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Coronal magnetic fields plays a central role in the solar flare process. It is believed that the flare is caused by fast releasing of pre-stored magnetic energy. However, until now it is still not clear what is the environment in which this energy release occurs? The rapid conversion of this energy into the kinetic energy of hot plasma and accelerated particles may in turn cause hazardous effects in interplanetary space. What are the characteristic radiation signatures of such flares and how do they occur and evolve? Extrapolation is presently the only way to reconstruct 3-d coronal field and radio methods provides almost the unique diagnosis of the coronal magnetic fields under certain assumptions. In this paper we study the associations between extrapolated 3-d coronal fields under non-constant-alpha force-free field and the flare process from ground and space observations.